State of Alaska
Department of Fish and Game
Sportfish Division

Nomination Form
Fish Distribution Database

X

Region: SEA

USGS Quad(s): Juneau A-3

Fish Distribution Database Number of Waterway: 112-16-10300

Name of Waterway: ☐ USGS Name ☐ Local Name

☐ Addition ☐ Deletion ☐ Correction ☑ Backup Information

For Office Use

Nomination #: 05-058

Revision Year: 2005

Revision to: Atlas ____ Catalog ____ Both ____

Revision Code: F-1

ADF&G Fisheries Scientist	Date
ADNR OHMP Operations Mgr.	Date 08/09/05
FDD Project Biologist	Date
Cartographer	Date

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Present	Anadromous
					☐
					☐
					☐
					☐
					☐

IMPORTANT: Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including: number of fish and life stages observed; sampling methods, sampling duration and area sampled; copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments:

Substatistos Kp in Wheeler CR

Name of Observer (please print): _____

Signature: _____ Date: _____

Address: _____

_____

This certifies that in my best professional judgment and belief the above information is evidence that this waterbody should be included in or deleted from the Fish Distribution Database.

Signature of Area Biologist: _____ Date: _____ Revision 02/05

Name of Area Biologist (please print):

Stream Habitat and Salmonid Distribution in Wheeler Creek, Southeast Alaska

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September 1993

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INTRODUCTION

Habitat inventory is an important tool to measure fish habitat and identify limiting factors for fish populations. Identification and measurement of habitat types can be used to compare relative abundance of habitat types and establish a baseline for monitoring. The purpose of this study was to conduct a habitat survey on Wheeler Creek and confirm the presence of chinook salmon (*Oncorhynchus tshawytscha*). Over 24 kilometers of habitat was surveyed on Wheeler Creek and its tributaries in June and July, 1993. The habitat survey did not include any stream channels above fish barriers. An estimate of juvenile salmonid density was made only on the smaller tributaries. Abundant age-0 coho salmon (*O. kisutch*) were observed as well as lower densities of age-1 and older coho salmon and Dolly Varden char (*Salvelinus malma*). Chinook salmon fry were observed in the lower main channel survey in July. The results from this survey are provided in this report.

METHODS

Study Area

Wheeler Creek is located approximately 35 kilometers from Juneau on northwest Admiralty Island; it flows north into Game Cove on Hawk Inlet (figure 1). Approximately 24.7 kilometers of the stream was surveyed ending near the private property boundary and tidal influence. The survey was divided into four main parts including two tributaries and two portions of the main channel--upper and lower (table 1). The survey included 17.9 kilometers of the main channel, of which 14.6 kilometers was below the upper tributaries, and 6.7 kilometers of two upper tributaries. We named the two tributaries included in the survey Upper trib and Cube Cove trib. The end point for the Wheeler

Creek main channel habitat survey was an impressive waterfall (more than 10 meters high) located 3,300 m upstream of the confluence with the upper tributaries. The Upper trib survey ended within a bedrock canyon at a debris barrier caused by a landslide, a distance of 5,334 m upstream from the confluence with the main channel of Wheeler Creek. The habitat survey of upper Cube Cove stream, the smaller tributary, ended at a ground water seep, 1,418 m upstream of the confluence with Upper trib. Most of this tributary was outside the Admiralty National Monument boundary.

Channel types identified during the habitat survey included PA5, MC2, FP3, FP4, and FP5 progressing downstream from the upper tributaries (Paustian 1992) (figure 1). The

Table 1. Wheeler Creek channel type characteristics and stream survey distances.

Stream	Channel type	Distance (m)	Gradient (%)	Incision Depth (m)	Remarks
Main channel (lower)	FP4	8998	<2	< or =2	Sinuous multiple channel
	FP5	5647	<2	< or =3	Flood plain channel
Main channel (upper)	MC2	450	2-6	4-20	Bedrock/alluvial gravel
	FP4	2848	<2	< or =2	Sinuous multiple channel
Upper Trib	MC2	940	2-6	4-20	Bedrock/alluvial gravel
	FP3	4394	< or =2	< or =2	Forested lowland < 10 m wide
Cube Cove trib	PA5	831	<1	< or =2	Beaver Dam/ Pond channel
	FP3	586	< or =2	< or =2	Forested lowland < 10 m wide

Channel Type Users Guide describes the channel types in detail. The abbreviations are as follows: PA5 is palustrine flood plain backwater slough; MC2 is moderate width and incision, contained channel; FP3 is narrow low gradient flood plain channel; FP4 is low gradient flood plain channel; FP5 is wide low gradient flood plain channel. The main channel was divided into an upper and lower section with three channel types (table 1). The main channel (upper) survey began at a waterfall as a MC2 channel type. From the waterfall the stream flowed through a bedrock canyon for about 430 m into a FP4 channel type. The Wheeler Creek main channel (upper) then continued for 2,900 m to the confluence with Upper trib. The remainder of the main channel to tidewater, approximately 14,700 meters, progresses from FP4 into a FP5 channel type. Upper trib survey descended 940 m through a bedrock/ alluvial gravel canyon, MC2 channel type, into 4,400 meters of FP3 channel. The Cube Cove tributary, which lies closest to Cube Cove, consisted of 831 m of beaver pond/slough habitat, channel type PA5, and 587 m of free flowing stream habitats, channel type FP3.

Sample Methods

Survey methods for the stream were adapted from Bryant et al (1992); channel unit descriptions were similar to those of Sullivan (1986). Habitat units were separated into a hierarchical system based on stream hydrology. Habitat units were separated into slow and fastwater units; side channel and off-channel units were identified and measured as separate units. Reach numbers were assigned to linear channel sections and could include one or more channel units; for example, several eddy pools could occur along a reach that was primarily a glide or riffle. A single habitat unit such as a large scour pool or riffle could extend over an entire reach. Each habitat unit was assigned a unique number. To avoid "microsampling," a minimum size for a habitat unit was established at 4 square meters, or less than one channel width for scour pools.

Habitat units were identified, and measured with a tape, sonic distance-measuring device, or counted paces. Area (square meters) was computed from length and width measurements. For most units, one width measurement was taken; for irregular or triangular-shaped units, top and bottom widths were taken to compute an average width. Cover was separated into debris jams, large wood, rootwads, slash, undercut, and substrate types. The area occupied by the primary instream cover type was estimated in percent for each habitat type. A similar estimate was made for both primary and secondary substrates in each habitat unit. The substrate component, dependent on particle size, may provide additional cover. Maximum depth was measured in all habitat units. Minimum depth was also measured for each pool to calculate residual volume. Large wood was divided into six classes based on length, diameter, and rootwad size. Detailed descriptions of habitat units, cover types, substrate sizes, and wood class sizes are found in the Appendix. A hand-held computer was used for data entry. An example of the format used on the computer is included in the Appendix.

It was not possible to estimate the fish densities in the main channel of Wheeler Creek by visual methods because the habitat units were too large to be effectively sampled by a single diver. Fish densities are only calculated for the small upper tributaries, Upper and Cube Cove. Fish species present in Wheeler Creek in Alaska Fish and Game surveys included coho and chinook salmon, cutthroat trout *(O. clarki)*, and Dolly Varden char. We did not observe any cutthroat trout during our survey. Fish, in the small tributaries, were counted by visual (snorkel) surveys of every 4th pool unit and every 10th riffle unit. The first unit was selected at random, and fish were counted in habitat units selected at regular intervals thereafter. In most cases, a single count was taken for each habitat unit by one diver. It is likely that some fish were missed; therefore, the counts represent a minimum population

estimate. No correction factor was applied to the counts. Fish were separated into size classes of < 60 mm, 60 to 100 mm, 100 to 200 mm, and > 200 mm. Coho salmon < 60 mm were considered to be age-0, age-1 and older fish were > 60 mm. Density estimates were calculated using dive counts and estimated water surface area.

RESULTS

Habitat Distribution

Riffles accounted for more area than did any other habitat type in Wheeler Creek main channel (lower) with 135,371 square meters (53 percent), followed by lateral scour pools with 53,074 square meters (21 percent) and mid-channel scour pools with 42,382 square meters (17 percent) (figure 2). Pool habitat comprised 38 percent of all habitat area (95,456 square meters). Riffles were the most abundant habitat type followed by mid-channel scour pools (table 2). Mid-channel scour pools tended to be smaller than lateral scour pools (table 3). Wheeler Creek main channel (upper) was similar to the lower main channel, 74 percent (41,694 square meters) of all habitat surveyed was riffle habitat (figure 3). Fewer lateral scour pools were counted, but the mean size of lateral scour pools was greater than mid-channel scour pools (table 2 and 3). Few side channels were observed in the main channel survey.

The beaver pond/slough habitat was the dominant habitat of Cube Cove tributary, accounting for 4,861 square meters (63 percent) of the area (figure 4). The remainder of the stream was nearly equally divided between riffle and pool habitat. Mid-channel pools

Table 2. Number of habitat units for each stream section surveyed, Wheeler Creek, 1993. (GL=glide, OC-PL=off-channel pool, OC-RN=off-channel run, OC-SL=off-channel slough, PL-BW=backwater pool, PL-DM=dam pool, PL-ED=eddy pool, PL-LSC=lateral scour pool, PL-MCS=mid-channel scour pool, PL-PP=plunge pool, RF=riffle, SC=side channel.)

Habitat type	Number of units			
	Main channel	Main (upper)	Upper tributary	Cube Cove tributary
GL	18	1	7	3
OC-PL	23	8	18	9
OC-RN	11	0	9	0
OC-SL	4	0	3	0
PL-BW	30	10	20	16
PL-DM	2	0	3	1
PL-ED	35	24	25	23
PL-LSC	80	8	76	12
PL-MCS	100	33	90	31
PL-PP	4	2	18	1
RF	110	32	128	26
SC	2	1	1	0
SLOUGH	0	0	0	1
Pool/Riffle ratio	1.5	1.3	1.4	1.6

were the most numerous habitat type followed by riffles and eddy pools (table 2). Upper trib, 39,504 square meters total area, was also nearly equally divided between riffle and pool habitat, 19,672 and 16,374 square meters respectively (figure 5). Upper trib had nearly equal numbers of lateral and mid-channel scour pools, while Cube Cove tributary had three mid-channel scour pools for each lateral scour pool (table 2). On both tributaries, the mean size of the scour pools were similar (table 3).

Table 3. Average size of habitat units (square meters), Wheeler Creek habitat survey, June and July 1993. GL=glide, OC-PL=off-channel pool, OC-RN=off-channel run, OC-SL=off-channel slough, PL-BW=backwater pool, PL-DM=dam pool, PL-ED=eddy pool, PL-LSC=lateral scour pool, PL-MCS=mid-channel scour pool, PL-PP=plunge pool, RF=riffle, SC=side channel.)

Habitat type /Stream	Main (lower)	Main (upper)	Upper trib	Cube Cove trib
	m^2	m^2	m^2	m^2
GL	770	500	132	32
OC-PL	39	26	21	6
OC-RN	151		28	
OC-SL	173		12	
PL-BW	65	42	14	13
PL-DM	96		87	12
PL-ED	53	42	19	12
PL-LSC	715	461	109	24
PL-MCS	424	232	90	26
PL-PP	122	106	43	17
RF	1231	1303	154	45
SC	141	1075	70	
SLOUGH				4861[a]

[a] Represents a single slough

Large wood (LW) was the predominant cover in all of the streams surveyed (figure 6). Undercut banks, slash (wood less than 10 centimeters in diameter), and rootwads followed. Total habitat area without any cover ranged from 13 to 63 percent. Upper trib had the greatest number of habitat units with cover. Cube Cove tributary, dominated by slough habitat, had no cover on 63 percent of the total area surveyed. The only cover in the slough was depth. Low density of cover in the large habitat units in the main channel of Wheeler Creek are typical of large floodplain channel types. Natural large woody debris volumes are moderately high in large floodplain channel types, but, generally, in-channel wood accumulations are less stable due to higher flood flows (Paustian 1992). Habitat units with

no cover on the main channel-upper and lower- were 32 percent and 52 percent of the total area, respectively.

Table 4. Wheeler Creek large wood tally by size class (class 1=length < 5 m, diameter <50 cm; class 2= length < 5 m, diameter > 50 cm; class 3=length > 5 m, diameter < 50 cm; class 4=length > 5 m, diameter > 50 cm; class 5=rootwad 0 .5-1 m; class 6=rootwad > 1 m).

Wood class/ # of pieces	Main channel (lower)	Main channel (upper)	Upper trib	Cube Cove tributary
1	106	78	285	32
2	9	3	48	
3	1017	323	298	51
4	110	15	62	1
5	6		39	3
6	122	46	48	10
Total pieces	1370	465	780	97
Kilometers	14.6	3.3	5.3	0.6[a]
Total pieces/ kilometer	94	141	147	162

[a] 831 m of slough not included, total distance surveyed=1.4 km.

Woody debris pieces greater than 5 m in length and less than 50 cm in diameter (dbh), wood class 3, was the most abundant class of wood in all stream sections (table 4). Rootwads were more abundant in the main channel, but were common in all sections. The total number of pieces per kilometer ranged from 94 in the lower main channel to 162 in the Cube Cove tributary. Most of the large wood in class 3 are trees with rootwads attached, but the rootwads were not counted separately. The classes representing smaller wood were more numerous in the smaller streams.

The dominant substrate in most areas of Wheeler Creek was gravel (table 5). The next most

dominant substrates were cobble, sand, and fines. Although bedrock does not appear as a dominant substrate in table 5, it was abundant in the MC2 channel types (upper main and Upper trib).

Table 5. Dominant substrate of Wheeler Creek and tributaries in percent (bedrock=single piece; boulder= >256 mm; cobble= 64-256 mm; gravel= 2-64 mm; sand= < 2 mm; fines= silt, clay(mud); organic= composed of fine organic).

Substrate	Main (lower)	Main (upper)	Upper trib	Cube Cove trib
	%	%	%	%
Bedrock				
Boulder	0.1	1.3	6.5	
Cobble	0.1	49.1	5.2	
Gravel	87.1	34.8	59.9	35.2
Sand	10.1	14.4	26.4	8.1
Fines	2.5	0.5	1.6	56.7
Organic	0.1		0.4	

Salmonid Distribution and Abundance

A total of 96 habitat units were sampled for fish in Upper trib and Cube Cove tributary. Fast-water habitat, riffles and glides, generally supported the lowest densities of coho salmon (figure 7-8). In all cases, the variability of densities in each habitat unit was high because no fish were observed in some units. Species observed on Wheeler Creek during the dive survey include coho salmon, Dolly Varden char, and threespine stickleback *Gasterosteus aculeatus*. Although no chinook salmon, were positively identified during the dive survey, young-of-the-year chinook salmon were observed in the main channel of Wheeler creek during the habitat survey in July. The chinook fry were observed in several off-channel pools approximately 4500 m downstream of the confluence with the upper tributaries. A few fry

were hand captured and positively identified as chinook salmon. All chinook observed were in off-channel pools or runs associated with large mid-channel scour pools or riffles in the main channel.

Coho salmon fry were abundant in both tributary systems in the snorkel survey area. The density of coho salmon < 60 mm ranged from 0.3 to 8 fish/m^2 (figure 7). The highest densities of coho < 60 mm were observed in eddy, backwater and off-channel pools. Coho salmon juvenile (>60 mm) densities in the river ranged between 0.01 to 0.37 fish/m^2 (figure 8). The highest density of juvenile coho was found in the eddy pools. All habitat types with the exception of off-channel sloughs and beaver ponds were sampled for fish. Dolly Varden were found in much lower densities than coho salmon; the type of habitat utilized varied by size class. Dolly Varden density ranged between 0.003 to 0.2 fish/m^2 (figure 9). Off-channel run (OC-RN) supported the highest densities of Dolly Varden less than 60 mm; fish between 60-100 mm were more abundant in lateral scour pools; plunge pools and eddy pools were the habitat types more abundant for Dolly Varden between 100-200 mm and greater than 200 mm, respectively. No trout were observed during the survey or in any of the dive sites. Dolly Varden were observed upstream of both the waterfall on the upper main channel and a landslide site on Upper trib.

DISCUSSION

Densities of coho salmon < 60 mm in Wheeler Creek were similar to other wild populations on Chichagof; however, juvenile (age-1 and older) densities were lower than those observed on Chichagof (Dolloff and Wright, unpublished data). Coho fry (<60 mm) densities in Kadashan River main channel ranged from 0.5 to 6.5 fish/m^2. Coho age-1

and older density ranged from 0.1 to 6 fish/m^2 in the Kadashan River; higher than the 0.01-0.37 fish/m^2 observed in Wheeler Creek.

Although we were not able to sample any beaver ponds during this survey, many beaver ponds are in the watershed. Beaver ponds are generally the best over-winter habitat for coho salmon in southeast Alaska. With the high densities of coho salmon fry in Wheeler Creek, it is natural to assume a healthy population of coho salmon in the beaver ponds. Sampling the beaver ponds in the upper Wheeler Creek drainage would test the assumption of normal densities of juvenile coho in the ponds.

The verification of chinook salmon presence was made during this survey. The chinook salmon in this stream have been identified as a sensitive population (K. Halupka, personal communication). As directed by the WO (Washington office) (FSM 2672) "sensitive species must receive special management emphasis to ensure their viability and preclude trends toward endangerment that would result in a federal listing". Little or no data exists for life history patterns of chinook salmon on islands in southeast Alaska. A rigorous, documented study needs to be made of habitat requirements and freshwater residence of all life stages of chinook salmon. Baseline monitoring to characterize existing condition of the chinook stock and to establish a database for planning or future comparisons and identification of limiting factors of the chinook population must be started. Further information must be collected on the population size, distribution and habitat needs of the chinook salmon. Total number of spawning adults, number of redds, and location and amount of spawning habitat available need to be documented. Rearing habitat for juvenile chinook salmon should be identified; density and growth estimates are needed for comparisons between years. Available food sources should be identified (aquatic and terrestrial). Monitoring of the

chinook salmon will be used to assess present conditions.

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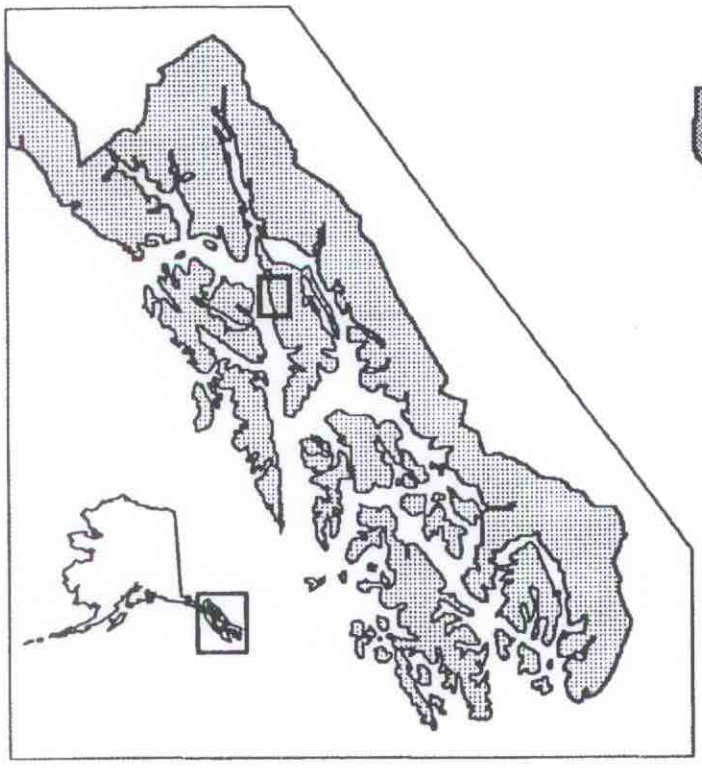
Admiralty Island Wheeler Creek Habitat Survey 1993



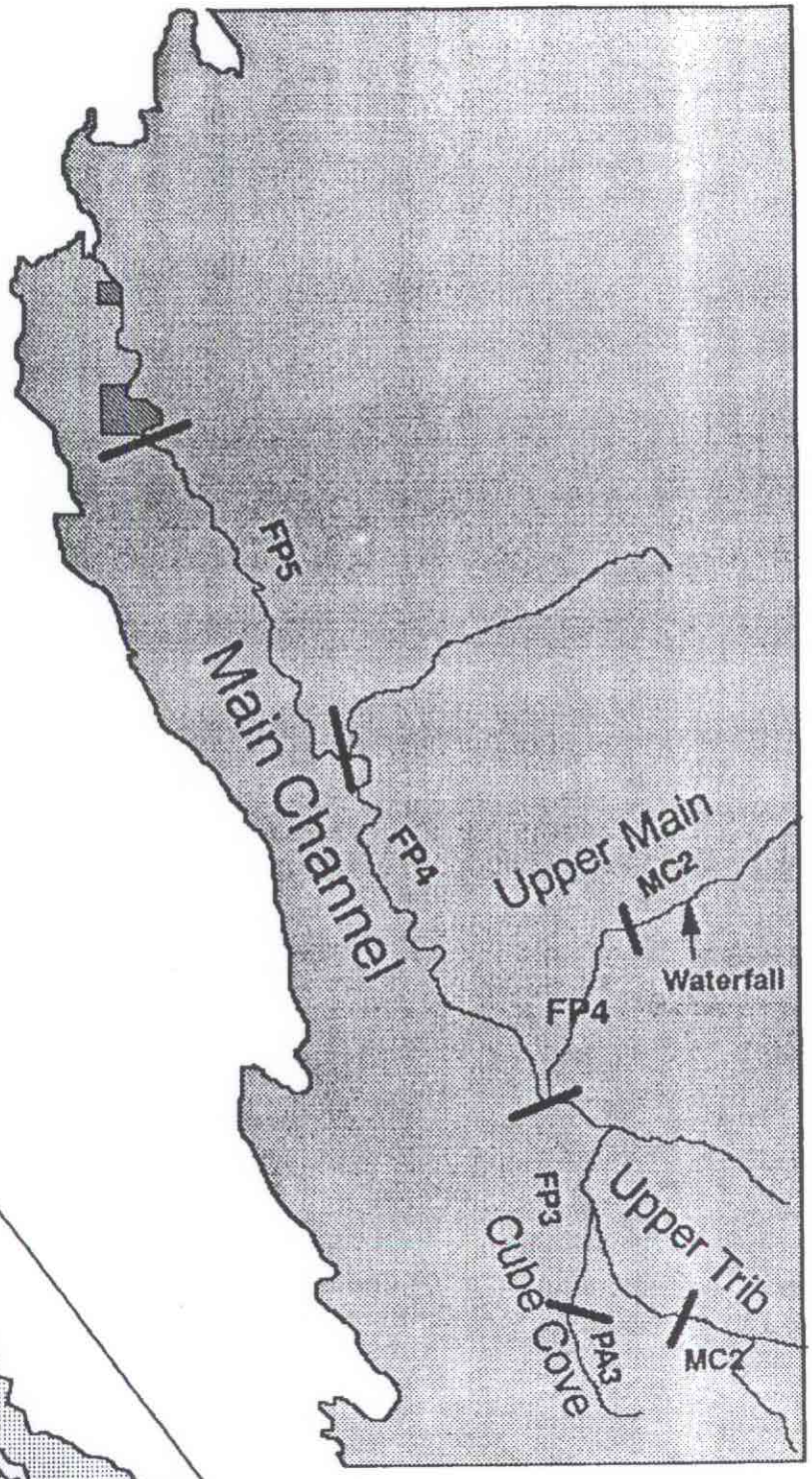


Figure 2. Total area of habitat units in Wheeler Creek main channel (lower) habitat survey area. SL=slough; RF=riffles; GL=glides; PL-pp=plunge pools; PL-mcs=mid-channel scour pools; PL-lsc=lateral scour pools; PL-dm=dammed pools; PL-ed=eddy pools; PL-bw=backwater pools; SC=side-channels; OC-SL=off-channel slough; OC-RN=off-channel run; OC-PL=off-channel pools.

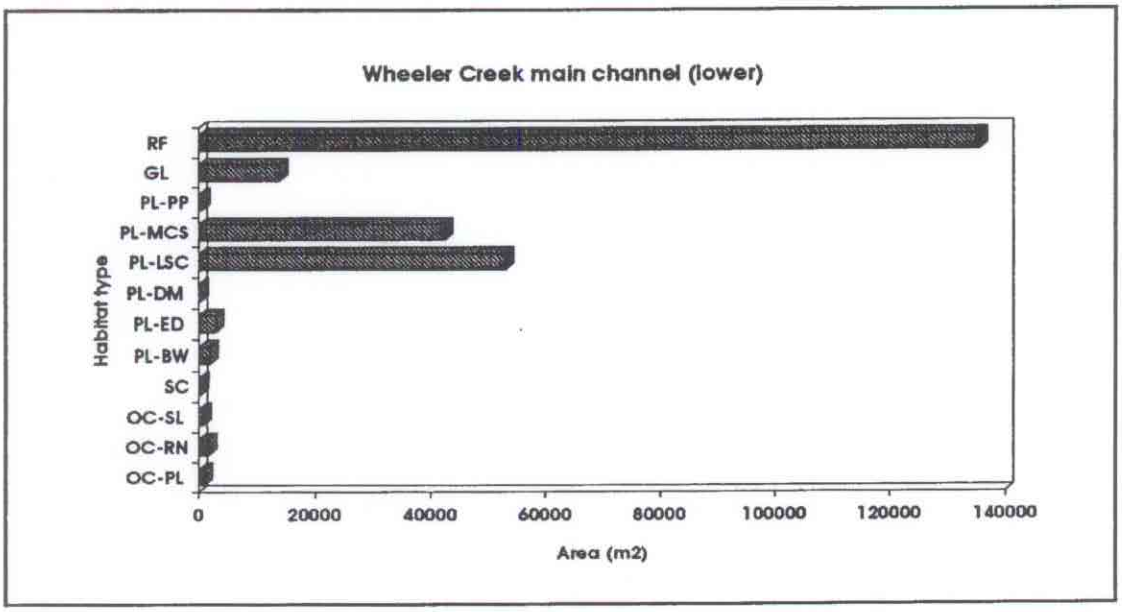


Figure 3. Total area of habitat units in Wheeler Creek main channel (upper) habitat survey area. SL=slough; RF=riffles; GL=glides; PL-pp=plunge pools; PL-mcs=mid-channel scour pools; PL-lsc=lateral scour pools; PL-dm=dammed pools; PL-ed=eddy pools; PL-bw=backwater pools; SC=side-channels; OC-SL=off-channel slough; OC-RN=off-channel run; OC-PL=off-channel pools.

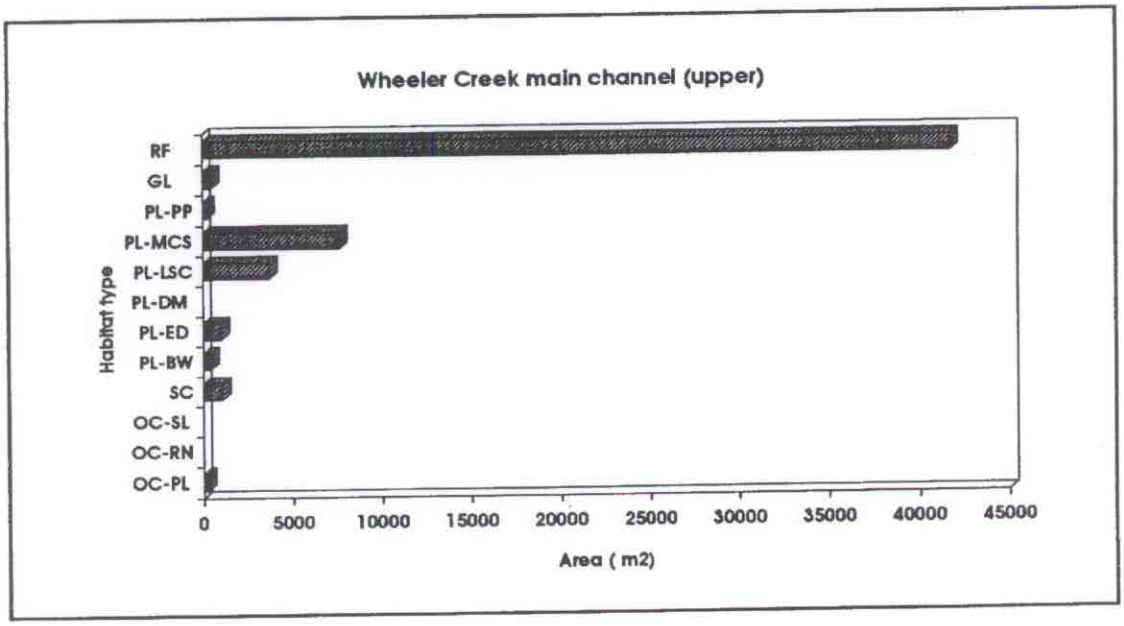


Figure 4. Total area of habitat units in Cube Cove tributary habitat survey area. SL=slough; RF=riffles; GL=glides; PL-pp=plunge pools; PL-mcs=mid-channel scour pools; PL-lsc=lateral scour pools; PL-dm=dammed pools; PL-ed=eddy pools; PL-bw=backwater pools; SC=side-channels; OC-SL=off-channel slough; OC-RN=off-channel run; OC-PL=off-channel pools.

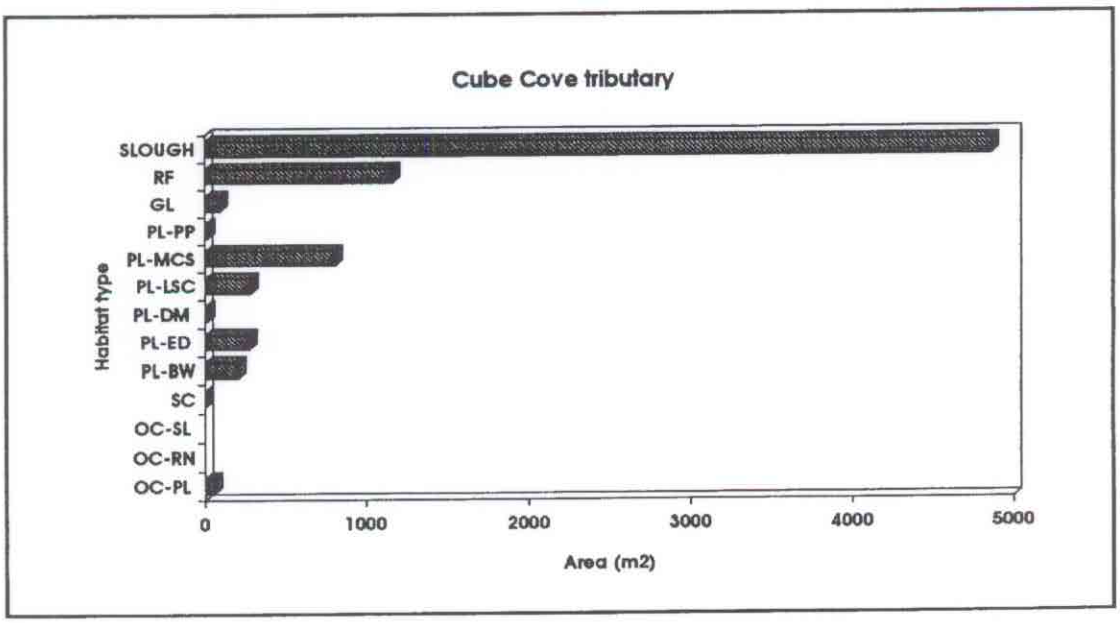


Figure 5. Total area of habitat units in Upper trib habitat survey area. RF=riffles; GL=glides; PL-pp=plunge pools; PL-mcs=mid-channel scour pools; PL-lsc=lateral scour pools; PL-dm=dammed pools; PL-ed=eddy pools; PL-bw=backwater pools; SC=side-channels; OC-SL=off-channel slough; OC-RN=off-channel run; OC-PL=off-channel pools.

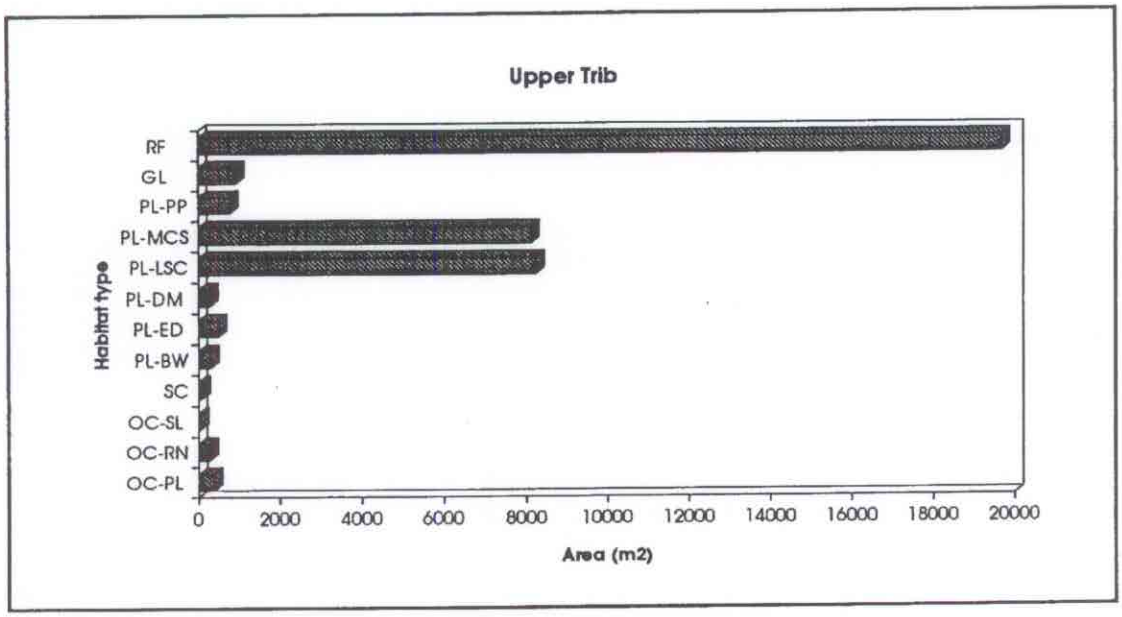


Figure 6. Percent stream area associated with cover types. DJ=debris jam; LW=large wood; RW=rootwad; SL=slash; UC=undercut; B=boulder; BR=bedrock; C=cobble.

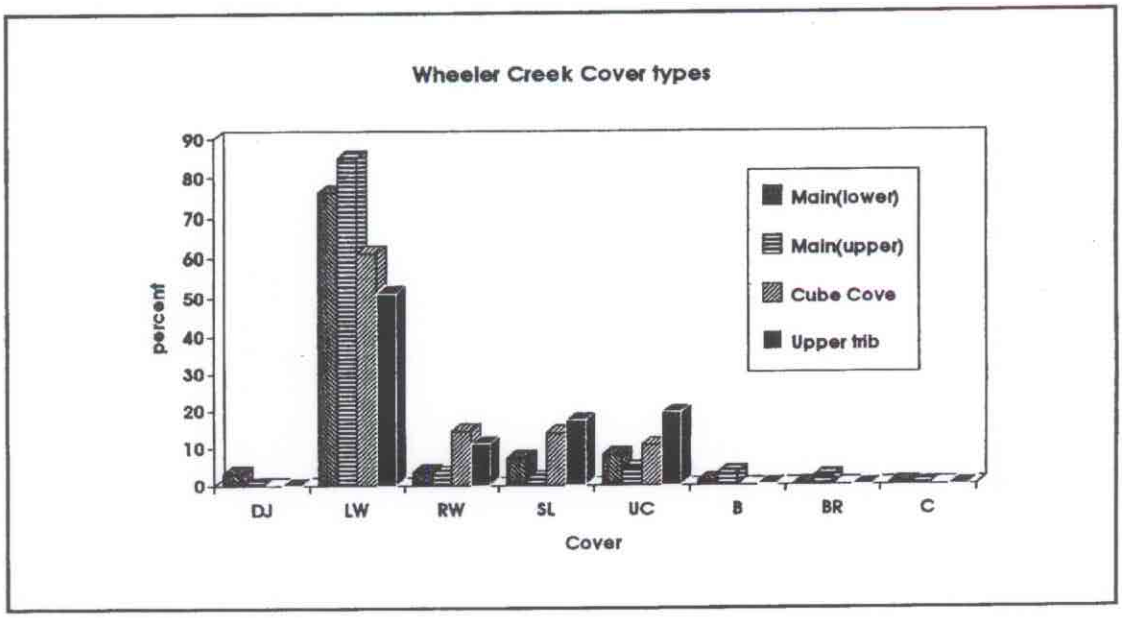


Figure 7. Mean density of coho salmon fry (age-0) in habitat units surveyed in Wheeler Creek, June 1993. RF=riffle; GL=glide; PL-pp=plunge pool; PL-mcs=mid-channel scour pool; PL-lsc=lateral scour pool; PL-dm=dammed pool; PL-ed=eddy pools; PL-bw=backwater pool; OC-RN=off-channel run; OC-PL=off-channel pool.

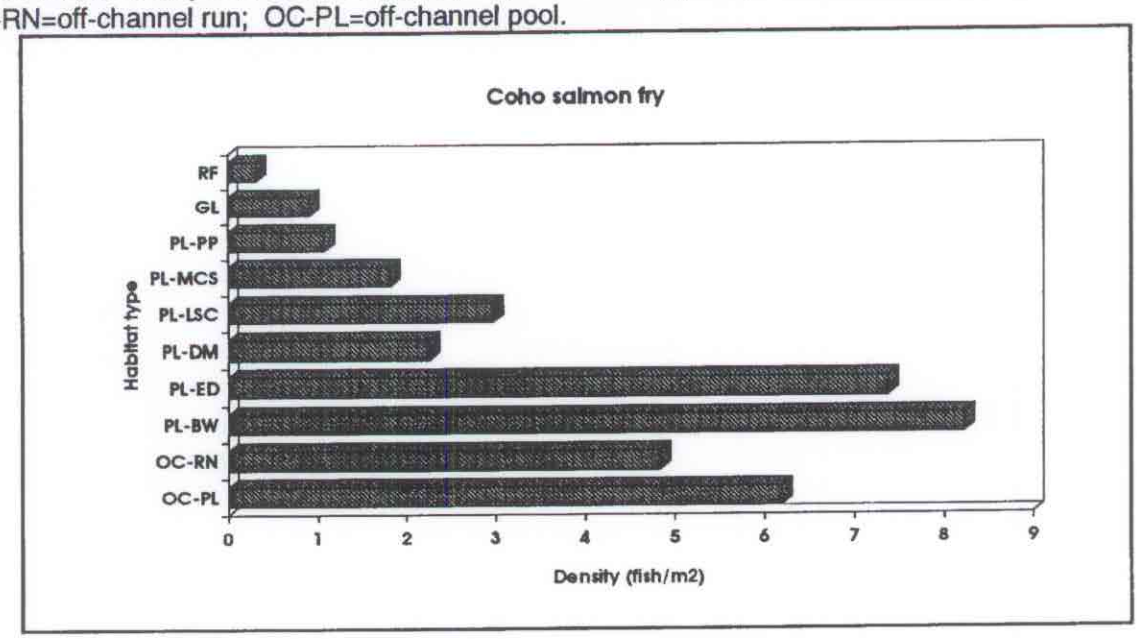


Figure 8. Mean density of coho salmon juveniles (age-1 and older) in habitat units surveyed in Wheeler Creek, June 1993. RF=riffles; GL=glides; PL-pp=plunge pools; PL-mcs=mid-channel scour pools; PL-lsc=lateral scour pools; PL-dm=dammed pools; PL-ed=eddy pools; PL-bw=backwater pools; OC-RN=off-channel run; OC-PL=off-channel pools.

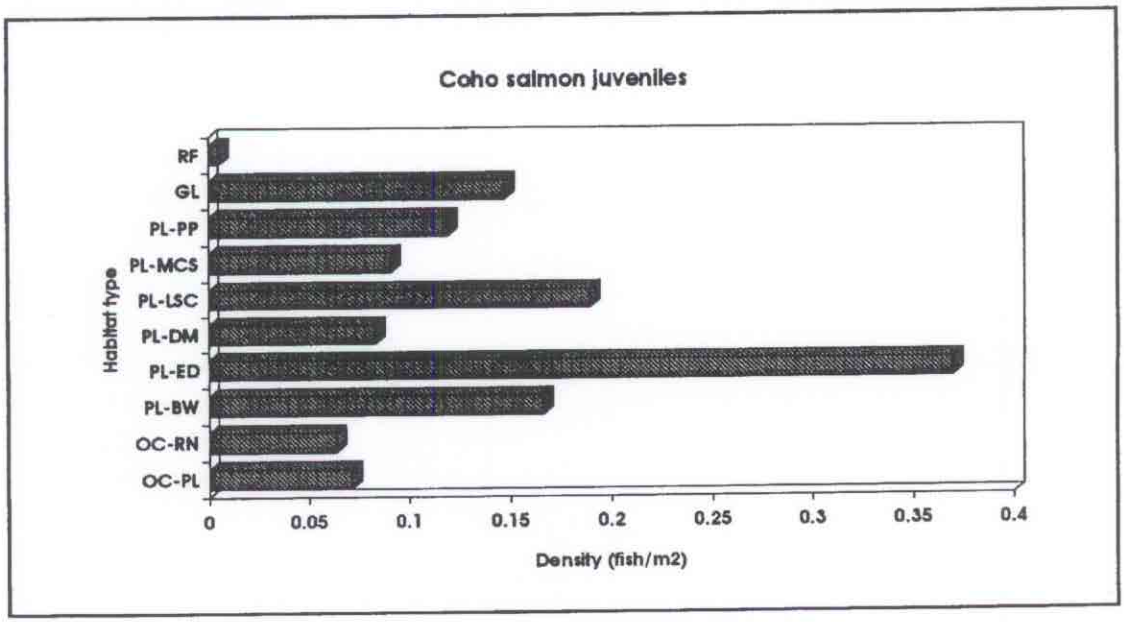


Figure 9. Mean density of Dolly Varden char by size classes in habitat units surveyed in Wheeler Creek, June 1993. Size classes=<60 mm, 60-100 mm, 100-200 mm, >200 mm. RF=riffles; GL=glides; PL-pp=plunge pools; PL-mcs=mid-channel scour pools; PL-lsc=lateral scour pools; PL-dm=dammed pools; PL-ed=eddy pools; PL-bw=backwater pools; OC-RN=off-channel run; OC-PL=off-channel pools.